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Day 02

Fire and Ice

2016

2.0.A Daily Outline

Christopher F. Bauer

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Purpose:

First classroom discussion of something read

- First outcome from reading about 17th Century understandings and technology
- Questions should emerge about the need to establish importance of technological development (thermometer, standardization) [reminiscent of Duschl & Giere arguments and others]

Reinforce importance of group process

- Continue to use nametags
- Introduce jigsaw structure and focus on content knowledge building

Address in some way some of the Question Bank questions from Tuesday

- Initiate model of exploring resources (group notes, posting), then apply resources to some application and product
- Readings come from whatever I could find from the web that I thought were content rich, accurate, readable for this audience, and complementary in focus (so as to provide information about different aspects of the phenomenon). The complementarity is an important aspect for the jigsaw structure.

Board

Please sign in – regular routine

Find place with your name – same group different location

Make a stick-on name tag with first name as well

Anyone not already registered, see me now

Address video and consent

I have planned for up to 3 more adds – this would fill out a sixth group and get up to 24

Materials

Name tags

Premade name cards

Poster paper

Poster markers

White board markers

Folder loaded with feedback on group work and new materials, incl recorder reports

Returns

Return group notes from Day 1 in their folders

Comment on readings for today

20 min?

40 including Q bank work

I asked you to read a few things about 17th Century understandings of heat.

In your groups, discuss those readings.

In your folders I have put several prompts to help you do that.

Manager today is the person who was Recorder yesterday.

You will need a recorder report for the group.

Debriefing:

Good discussion. Necessary to provide some feedback to comments rather than just letting them hang there. This acknowledges their work on the questions.

I went around one group at a time on each of the three part 2 questions. Cycling until we ran out of unique comments. I interspersed comments such as:

- This being the start of systematic experimentation.
- Asked them what they noticed about the writing? Got to script S. Conversational tone. I talked what it meant to be “before the Royal Society”
- I acknowledged again the importance of question generation.
- I answered a couple of questions outright (what is nitre, which led to me commenting on gunpowder) – that’s a connection I had not made before
- In looking at their group notes, they did a good job at bringing out important aspects – the Question Bank for today says it well:
 - They wondered about Boyle’s motivation. The WHY of his interest. And WHY this particular aspect of his interest
 - They noticed the concern about standardization of instruments and measurement
 - They picked up on what was not yet understood: cold as a thing of itself, and perhaps different from hot, was heat an “accident” or did it reside somewhere

Information that might expand the discussion – not used

- Up to now, idea that certain principles were at work in determining properties was long-standing idea: earth, air, fire, water principle of heat, cold, liquids
- Elements that were known as substances up to mid 1600s
 - C, S, Au, Ag, Sn, Sb, Fe, Cu, Pb, Hg, As, P, Bi
 - Liquids available: waters, oils, spirits, mercury
 - Freezing point of mercury (- 38.8 C, - 37.8 F) bp (357 C, 674 F)

Activity Two Physiology, neurology, and sensation of hot/cold

60 min?

You asked some questions on Tuesday, most of which had something to do with this topic.

I have provided you a set of materials in your folder about some aspect of this broad topic.

Each table has something different.

Your task is to read through the materials, use the guiding questions to help you make sense of the information. Your group will produce a set of notes (Recorder Report).

After about 25 minutes, you will leave your current group and join another group (same color name tag). In that new group you will be given a new question that asks you to apply what you have learned. Each person in that new group has a unique expertise. So, what you learn in the first group is really important because you might be the only person in the next group that knows anything about it.

Questions about the process? Maintain your group roles during the first stage. I will monitor your progress and you may use me as a resource.

I won't give you the question for the second stage until you get there. But I will tell you the task. The task is to construct a poster that provides an answer for the question I give you.

Source Materials for Stage One Task

[each grabbed from web or texts; given a letter label; scan and post on BB]

Group 1:	B:	action potential basics
Group 2:	A :	neuron firing adaptation patterns
	C:	action potential (different source)
	D:	neuron structure and types
Group 3:	E:	thermoreceptors
	F:	senses and neurons
	G:	senses and neuron structure
Group 4:	H:	regulation, hot/cold sensors
	I:	thermoreceptors and hypothalamus
	J:	hot/cold neurons
Group 5:	K:	Thermoreceptors WP – details
	L:	Neuron receptor structure and function

Monitor progress: try to push movement to new group by 30 minutes mark

Took more like 40. So I put off the second part of the challenge to next day.

Christopher F. Bauer, Principal Investigator.

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This allowed collecting and posting of Stage One notes, so that they can bring their own copy on Tues.

Group Challenge

- | | |
|--------|--|
| Green | A popular Scandinavian thing to do is to go from a sauna and then jump into a pond through a hole cut in the ice. Explain what that person experiences. You must incorporate as much of the Stage One information as possible. |
| Pink | A popular Scandinavian thing to do is to go jump into a pond through a hole cut in the ice, and then get out and go into a sauna. Explain what that person experiences. You must incorporate as much of the Stage One information as possible. |
| Yellow | Everyone probably has experienced chewing or handling something that contains menthol, which creates a sensation of coolness. Propose an explanation for how that happens. You must incorporate as much of the Stage One information as possible. |
| Violet | Everyone may have had the has experience of eating something that contains capsaicin (e.g. in chili peppers), which creates a sensation of heat. Propose an explanation for how that happens. You must incorporate as much of the Stage One information as possible. |

Monitor time – this activity can go over to next day, but I don't want it to extend and take up a lot of time. Primarily, this is to give everyone a sense of process.

10 min

Depending on time, each Spokesperson should walk us through the poster, identifying most critical features (2 minutes each presentation, 2 minutes each questions from rest of class)

Posters will be photographed, and placed on BB as record of this work.

Discussion on readings:

- Excerpt from Robert Boyle's "The Works"
- Bentham "Some Seventeenth Century Views ..." intro page
- Christopoulou, "RB's Experiments on Cold..."

Using your notes,

- 1) Start with each person sharing something interesting found any of the readings. Or a question that arose in their mind.
- 2) Have a discussion around these prompts. But note particularly additional questions that arise while you are talking.
 - a) What was the nature of understanding of heat and cold in 17th Century?
 - b) What was and was not known or understood?
 - c) What were barriers to development of understanding?
- 3) Spokespersons will be asked to report out to the class on questions 2abc. Recorders should write questions that emerge up on poster paper hanging on wall. Each group has a sheet to work with.

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Table 1

Neurons carry signals via action potentials. What is that?

What processes happen to initiate an action potential?

Are they constant or temporary?

How does it travel?

What distinguishes a strong stimulus from a weak one?

Table 2

What is the structure of neurons?

How do neurons work?

What turns a neuron on?

What does it mean that sensory receptors “adapt”? What is the consequence of that?

Where on the neuron is the “on” switch?

Table 3

What are thermoreceptors and where are they found in the body?

What kinds are there? How do they differ?

How does sensation change as a function of exposure temperature?

What exactly do they respond to?

Table 4

What are thermoreceptors and where are they found in the body?

What kinds are there? How do they differ?

How are they connected to the brain?

How does this relate to sensation?

Table 5

What are receptors on neurons?

How do they work?

Specifically, what are thermoreceptors and how do they work?

(Likely) Assignment:

I will confirm this once I have set up in BB.

Readings: to be posted on BB

- Edm. Halley, Phil Trans 1693 About temperature measurement
- Thermoscope
- Romer scale
- Excerpt: "Evolution of Thermometer" Harvard Case Studies 1950

Download Colorado PhETs – instructions on this will be coming

You will be asked to do some exploration with this. Don't know how much just yet.

This will be an initial first step to continued discussion and use of this on Tuesday.

If you have a portable computer, it would be very handy if you could bring it.

Bring eye protection to Tuesday class – will need for sure.

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Your folder contains enough copies of materials for each of you to have a set.

There are three stages of activity today:

1) Discussion and report out about readings.

I have four sets of copies of those since I didn't get the BB site open for you to get them before.

Give them a quick scan, then see how well the students are able to get into the meat of the ideas of these readings.

If you were in my shoes during that debriefing, what would you be saying?

What might you have done to prepare for that?

2) Stage One of Jigsaw

Each table has a set of things to study, and a set of questions to guide them.

While they are getting started, I want you to eavesdrop on one or more tables.

What do you think will be important to notice? Have a discussion about that.

Each of you pick one table. Go eavesdrop close enough so you can hear the discussion. After five minutes, rotate to another group. Keep doing that til we stop the activity or you make a full cycle of all tables.

3) Stage Two of Jigsaw

The groups will re-arrange and take on the next task.

While they are getting started, compare your observations about the groups during the first stage.

What did you notice that would lead you to believe that learning was happening?

Did you end up noticing aspects of behavior that you had not planned on?

Each of you pick one table and eavesdrop during Stage Two. After five minutes rotate.

After the full rotation, get together and think about what would be most valuable to do once the posters are created.

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